

Forget (Am)

DENTAL ANOMALIES
AND THEIR
INFLUENCE UPON THE PRODUCTION
OF
DISEASES OF THE MAXILLARY BONES.

BY

AM. FORGET, M.D., C.L.D., ETC.

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DENTAL ANOMALIES

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OF

LARY BONES.

A.D., ETC.

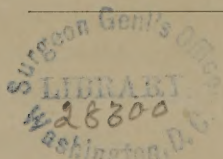
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INTRODUCTORY.

THE bones of the face are subject to lesions of vitality and structure that are common to the other parts of the body; these belong to the maladies of the osseous system, and are under the same histological influences.

There are some lesions, however, that belong more especially to the maxillary bones, and differ from the others in their anatomic characteristics, and particularly in their origin—these are the subject of the following treatise.

This work is intended to show the anatomical and physiological causes that predispose the jaws to organic lesions, requiring the intervention of art. To demonstrate, by pathological anatomy, the effect of anomalies in nutrition and in the position of the teeth upon the production of these lesions—to exhibit the primordial characters which may put the surgeon on the track of these anomalies, and enable him to prevent their pathological consequences—finally, if they already exist in a tumor, to open a way which, rendering the origin and nature of the tumor evident, will restrict the surgical operation to the diseased parts, and preserve the continuity of the bone, the total or partial ablation of which would not then be justified,—such was the aim that I proposed to myself; and the public reward bestowed upon my work by the Academy of Sciences encourages me to hope that I have succeeded.

INDEX

This index of the book was compiled in order to assist the student in the study of the book. It is not intended to be a substitute for the book itself, but rather a guide to it. The index is arranged in alphabetical order of the subjects treated. The subjects are grouped into four main divisions: (1) General Principles, (2) The History of the Subject, (3) The Theory of the Subject, and (4) The Practice of the Subject. The index is intended to be a guide to the book, and not a substitute for it. The index is arranged in alphabetical order of the subjects treated. The subjects are grouped into four main divisions: (1) General Principles, (2) The History of the Subject, (3) The Theory of the Subject, and (4) The Practice of the Subject. The index is intended to be a guide to the book, and not a substitute for it.

PRELIMINARY.

THERE is no portion of the living skeleton more liable to numerous and varied diseases than the maxillary bones—the inferior maxillary in particular. The morbid aptitudes of this organ spring so naturally from the complexity of its structure, and its great degree of vitality, that the attentive observer can regard the fact only as a consequence of that peculiar organization by which these bones partake of an organic activity and a nutritive movement, to a greater degree than occurs in any other part of the bony system.

These bones offer a protecting canal for a vascular and nervous apparatus, and receive from it a great number of nutrient vessels. Besides, the presence in the jaw-bone of those dental bulbs, which are awaiting their successive evolutions, is a permanent cause of irritation and congestion, the intensity and duration of which are in proportion to the difficulties and anomalies attendant upon their development. There are also morbid influences, of which the action, however distant, is not the less certain; and to these must be added all the diseases to which the tooth is liable in the various phases of its growth. These are slight and circumscribed, and often pass unperceived; but by their persistence and extension in some cases, and especially by their extension into the alveolar tissue, they become points of departure for osseous lesions, which require the intervention of art.

An analysis of the vast amount of information which has been accumu-

lated in late years upon the diseases of the jaw has convinced me of the justice of the etiological view already stated, and I feel confident that the student, who approaches this question of pathognomy by the same means, will attain the same result. I will endeavor to justify my opinions upon the subject in the following essay, which I have divided into two chapters—the first, devoted to the consideration of the anomalies of nutrition—the second, to those of the position of the teeth, with the intention of exhibiting in both cases the connection existing between these anomalies and the various morbid conditions of the maxillary bones.

DENTAL ANOMALIES

AND

THEIR INFLUENCE UPON THE PRODUCTION OF DISEASES OF THE MAXILLARY BONES.

CHAPTER I.

ANOMALIES OF NUTRITION AND DEVELOPMENT.

OF all the observations embraced in this chapter I can find none more worthy of place in the first rank than one which I have already reported to the *Société de chirurgie*. The case offers an instance both of anatomical anomaly and pathological lesion—a morbid duality not only very rare, but unexampled in the human species, if I may judge from the fact that strict research has not found another on record.

OBSERVATION 1.—Osteo-dental tumor, size of a large egg, encysted in the thick part of the inferior maxillary—ulcerous inflammation of the parietes of the cyst—numerous ossifluent fistulæ—resection of the left half of the body of the jaw and a portion of its branch—cured.

Early in May, 1855, M. L., a banker of Guadeloupe, introduced me to his son, whom he had brought to Paris with the intention of subjecting him to the necessary surgical operation for the remedy of a disease of the inferior maxillary, which had made its first appearance when the patient was five years old.

History of the disease.—At that period (five years) young L. suffered from pains in his left jaw; they were for some time intermittent, then continuous and acute. When the patient was seven years of age, two small healthy molars were extracted, under the belief that they were preventing the evolution of the second teeth. The operation gave great relief, and the pain ceased; but shortly afterwards a small, round, hard tumor appeared on the external face of the jaw, near the alveoli of the teeth that had been removed. The tumor caused no suffering to the patient, and

made no sensible progress for a period of eight years. The whole of the left side of the jaw then became tumefied, and the bone, in the words of the patient, broadened and rounded. He also observed at this time that the large molars were wanting in the diseased part, while they were regularly developed on the right side.

This morbid enlargement was accompanied by frequent fluxions of the gums, cheek, and whole left side of the face. The recurrence of this fluxion was attended by great pain, and caused an increased tumefaction in the soft parts to such an extent that the difference between the sides of the face became absolute deformity.

In November, 1854, a violent inflammation occurred in the base of the jaw and the cervico-maxillary region. Antiphlogistic treatment was employed, two applications of leeches were made, and the inflammatory symptoms decreased, and, fifteen days afterwards, purulent matter formed in the thick part of the cheek, which opened spontaneously, allowing the issue of a large quantity of fetid pus. The opening of this abscess became fistulous; the surrounding tissues thin, detached, and under them the bone was naked for a very considerable extent.

Actual condition.—Young L., aged twenty, strong, well-developed, with an excellent constitution, and health perfect in all respects, excepting the local affection.

The disease appears externally in a considerable tumefaction of the left cheek, which is more than three times its natural size; and the tumor has caused a very marked eccentric development to the corresponding maxillary bone.

When the patient opens his mouth, which he does without effort, the whole left side of the bone was seen to resemble a large turkey-egg; the base of the jaw being confounded, without appreciable line of demarkation, with the internal and external faces which describe a very considerable curve.

The tumor is uniform, without depressions, or any irregular swellings upon the surface. It does not yield to pressure, and no part of it gives that sound of crepitation which is a characteristic of attenuation of the osseous tissues. The external swelling hides the superior and lateral part of the neck, descending in front several centimetres, [0.3937 inch.] The enlargement of the bone has forced the tongue from its true direction, and the floor of the mouth has been driven from the left to the right.

The alveolar ridge, singularly enlarged, contains none of the grinding teeth except the first bicuspid, which stands regularly in its socket. The tissue of the gums is dark red, and unusually thick and hard. In a circumscribed spot, about the size of a twenty-centime-piece, the tissue is broken, and exhibits an unequal, wrinkled, grayish surface, which gives a dry sound when struck with a metal probe, as if the crown of a tooth were hidden in the cavity.

The disease does not extend in front beyond the symphysis of the chin; behind, it reaches a point on the posterior edge of the ramus, that can be touched by inserting the finger into the isthmus of the throat. The upper portion of the ramus is perfectly healthy, as is also the neck and the condyle.

I will add, in order to complete the symptomatic description, that there are many ossifluent fistulous openings at the base of the tumor—two fingers' breadth from the left labial commissure there is an old purulent collection that has caused the detachment of the skin, which is purple and very thin, to the extent of four centimetres. Finally, many submaxillary lymphatic ganglions are much hypertrophied and hardened.

The functional disorders arising from this pathological condition, which were very slight at first, are now increasing every day; vocal utterance is embarrassed; mastication is painful and incomplete; deglutition is effected with difficulty; and respiration is very difficult every time inflammation is renewed in the tumor. Lastly, the patient suffers from two serious inconveniences, one resulting from the very marked deformity of the face, and the other from the incessant flow of fetid pus proceeding from the complicated fistulæ of the osteo-dental caries.

Diagnosis of the disease.—An analysis of what has been already stated will give us, in the first place, a fact of primary importance, which I think shows the very origin of the evil, and seizing its intimate nature, exhibits the initial point of departure. I refer to the connection between the occurrence of the disease in the jaw and the process of the second dentition, in which the jaw-bone was the centre of a fluxion, determined and maintained by the excessive nutrifying action of which it was then the seat.

A little later, that is at seven years, the precise period when the growth of the dental bulbs is completed by their eruption from the alveoli, the pains increased to such a degree that the extraction of two healthy teeth was considered necessary. This operation caused only temporary relief, and was soon followed by a new morbid manifestation, viz., the tumor. If these remarks are not sufficient to establish the histological connection that I have in view, let us add the additional fact that appeared some years later—the absence of the large molars. This anatomico-physiological aberration, the morbid accidents that preceded it, and the pathological fact that occurs in the tumor, cannot be a mere coincidence.

But if it is so easy to reach the origin of the evil, is it equally easy to explain its nature? This part of the problem may be more difficult, but I do not believe that the solution is impossible.

Taking into consideration the slow development of the tumor, the uniformity of its exterior, its circumscribed limits, the firmness of the different parts of its surface, bounded in every direction by a bony plane, I would immediately assume the existence of a pathological product in the centre of the maxillary, and that the eccentric development of the bone had fol-

lowed the growth of this product in such a manner as to enclose the whole of it in a cyst. I have often observed similar proceedings of nature, and I dwelt upon them in my inaugural thesis of 1840, (*Researches into the Nature and Treatment of the Cysts of the Maxillary Bone*), under the designation of the osseous cyst containing a solid product. I believe that the composition of the latter cannot be ascertained with certainty, and, therefore, without speaking of the nature of the anatomic elements which constitute the pathological production, I will restrict myself to diagnosing to the centre of the maxillary bone the existence of an omeomorphic tissue—considering the hypertrophy of the cervical ganglions as the result of a sympathetic irritation, and not as a symptom of cancerous infection. The unimpaired health of M. L. is sufficient ground for this belief; for, if the malady had been of this malignant character, it would have produced more serious local disorders, as well as deleterious effects upon the general system.

Unwilling to depend entirely upon my own skill, I appealed to two of my colleagues of the Chirurgical Society, MM. Michon and Denonvilliers, who, after examining young L., agreed with my opinion upon the method of the development of the disease, its nature, and the necessity of resecting the half of the body of the bone—an operation which I performed with their assistance, and in presence of MM. Pinel de Golleville and Mongeal, and M. Felix Baudoin, a distinguished pupil of the Paris hospitals, on the 16th June, 1855.

Operation.—The patient was laid on his right side, his head raised and resting on a rather firm pillow. Standing in front of him, I commenced the operation, having first administered chloroform.

By means of an incision commencing in front of the lobe of the ear, turning the base of the tumor and terminating at a centimetre from the projection of the chin on the right side of the face, I circumscribed a large flap, which, when dissected and thrown over upon the cheek-bone, appeared to be formed of the whole of the thick part of the cheek, and of part of the lower lip. The dissection of the soft parts took considerable time, as much on account of intimate connections, in many places, with the bones behind them, as on account of the ligatures necessary for the various arterial branches.

Section of the bone.—Keeping the flap raised, I sawed the bone in front, upon the alveolus of the canine tooth, which I had previously drawn. Behind, I cut through the ramus, between the angle of the bone and the origin of the dental canal. In making the front cut I found a tooth placed horizontally in the thick part of the bone, precisely under the alveolus, through which I was cutting. Instrument, a chain-saw.

Ablation of the tumor.—After isolating the osseous tumor by these two cuts, I detached the lower parts, using a probe-pointed bistoury to divide all that part of the floor of the mouth that adhered to the internal

face of the jaw. While one of my assistants held the tumor turned from within outward, I cut behind the muscles of the submaxillary region, turning the edge of the bistoury toward the tumor, to avoid the base of the tongue, and especially the anterior column of the velum of the palate, which, as I have said, marked the termination of morbid development. The division of the tissues required numerous ligatures for the arterial branches. I also introduced a small ball of wax into the orifice of the dental canal that was opened by the saw, thus stopping the hæmorrhage from the dental artery. To complete the operation, and remove all diseased tissues from the wound, I cut away two lymphatic ganglions that were situated under the tongue, above the genio-hyoidei muscles and the anterior belly of the digastric muscle. This done, I waited until all danger of hæmorrhage was over before proceeding to dress the wound.

The flap, left to itself, fitted into the wound by its own weight, and the continuity was entirely complete. The edges were easily brought together and kept united by a twisted suture—this I disposed in sixteen points, in such a manner as to allow a hiatus for the most dependent part; here I placed the threads of a ligature, so as to afford a permanent and easy issue for the purulent fluids. A fenestral bandage, a coat of cerate, a pledget of lint soaked in cold water, and, outside of all, a bandage round the chin, completed the dressing.

Remarks on the process.—The method used in the operation was especially directed to the preservation of the lower lip, by avoiding an opening on its free side, which would have divided it throughout. Precautions were taken, also, for the preservation of the flap—this was done by making the incision, which determined the length of the wound, of sufficient extent to allow the easy introduction and free play of the saw. The rule might be stated thus: instead of confining the incision within the limits of the tissues that are to be removed, let it extend two or three centimetres beyond them, both before and behind. This allows the dissection of the soft parts to be carried further, and a greater separation can be obtained between the edges of the wound and its angles; this permits the surgeon free use of the saw.

Consequences of the operation.—The patient, when carried to his bed, and his head raised upon a horsehair pillow, soon fell asleep; wakened at the end of an hour, and rejected a large quantity of blood, without any effort of expectoration; remained until night somnolent and prostrated. Some spoonful of broth administered every two hours—in the intervals, wine and water. Reaction very evident by eight o'clock in the evening; skin hot, face animated, pulse at 106 per minute.

June 17, day after the operation. After a restless night the fever is intense, (130 pulsations.) No emission of urine for twenty-four hours. Hypogastric region tight, not painful; percussion proves considerable expansion of the bladder. On attempting to introduce the catheter into

the bladder, the spasm of the urethra rendered the introduction of the *sonde* very painful, and I desisted. Prescribed friction with camphorated oil upon the hypogastric region, followed by a large cataplasm—resulting, as intended, in an abundant discharge of urine at the end of two hours.

The wound in a satisfactory condition; no tension, swelling, nor unusual redness along the course of the sutures. The tissues having joined at some of the points left open for the issue of the fluids, I reopened them. Withdrew the pin nearest the symphysis of the chin. Same dressing as before. Tisane, gum-water. Diet absolute.

June 18. Through the night there has been continual and intense febrile action; pulse at 135. Patient restless and sleepless. Pulse now 120, slight, hard, depressible. Heat of the skin moderate. Patient declares himself better; complains principally of the fatigue from the constant expulsion of bloody saliva. I remove all the pins except three in the middle of the wound, and substitute a simple bandage for the wet compress. *Prescription*—chicken-broth, opiate for the night.

June 19. Fever diminished; pulse 90. The last pins removed, and a moderate pressure directed from the base to the perimeter of the flap. I provoke a flow of pus, abundant and of good character, issuing at the point of the wound where the ligatures are placed. *Prescription*—broth, arrow-root.

June 20. Same as yesterday; night calm; sleep prolonged. Edges of the wound well joined throughout the anterior third.

June 21, sixth day after the operation. Sensibility exists in the neighborhood of the wound; no elevation of pulse.

June 22. After midnight, patient was seized with severe chills and violent headache, with coldness of the lower extremities. Fever followed the chill, pulse rising to 130, and now but little lower. Cheek tumefied, hot, red, painful to the touch. All the characteristics of incipient erysipelas. This complication, occurring on the seventh day, threatens to compromise the union of the parts, still incomplete through a large portion, and not strong where it has taken place.

Happily it had no serious effect; the recovery was retarded for some days, but cicatrization followed regularly.

I ascribed the erysipelas to gastro-intestinal irritation, and combated it externally with mercurial ointments, which, failing of effect, I used colloidion; internally, by purgative salts and acidulated and diluent drinks.

June 24, and the following days. The erysipelas progressed, giving place, especially during the first days, to an intense febrile reaction. From the left cheek, its point of departure, it successively invaded the ala of the nose, the eyes, temple, and the hairy skin that had been shaved; terminated behind by the course of the occipito-parietal suture. From the left side it passed to the right, spreading over the cheek in a period of ten days.

The erysipelas being conquered, the patient recovered rapidly. Strength-

ening food was carefully administered—at first pottages, then solid food—and on the eighth day after the operation, young L. partook freely of bread, meat, and other articles requiring mastication. Toward the end of July, I presented him before the *Société de chirurgie*—the cicatrice was linear, and the face showing no sign of deprivation of parts or other deformity.

Anatomical examination of the tumor.—With the surrounding soft parts it was an exact ovoid, thirty centimetres [11·8 inches] in circumference at its greatest diameter, and twenty centimetres [9·05 inches] at its least.

The soft parts adhering to its external face are marked with many fistular passages ending at inflamed and ulcerous points of osseous tissue. This tissue is thin, soft, and depressible, and is perforated by two orifices which lead to the interior of the cyst, from which flows a purulent, viscid, reddish liquid. A stylet introduced into one of these openings is stopped by a hard body, which sounds, under percussion, like a compact tissue denuded of its periosteum. In order to reach this object, I removed the tissue of the gums, which, condensed into a thick bed, forms a sort of operculum for the upper part, completing the cyst in which the morbid product was situated. This dissection shows that the jaw, from the ramus to the first small molar, which is in its socket, has been changed into a cavity containing a compact, saxiform, ovoid mass, the size of a large egg; grayish, unequal surface, studded with small tubercles, surrounded by a bed of enamel; and completely buried in the thick part of the bone. (See Plate I. fig. 1.)

I next divided the tumor, along its axis, into two equal parts, each confined to the corresponding half of the osseous cyst that was comprised in the division. This revealed the composition of the tumor: it was formed of a smooth, glossy, compact, homogeneous, ivory-like tissue of a whitish-brown color. In the centre of it a kind of regular disposition of its elements could be discerned by the naked eye. (See Plate I. figs. 2 and 3.)

Between the tumor and the wall of the cyst was a thick, fibro-cellular tissue, free on the side of the former, where it covered the whole intramaxillary portion, (it did not extend over that part covered by the gingival tissue,) and was joined to the latter by filamental prolongations of a cellulo-vascular appearance—these being attached to the numerous openings that covered the face of the cyst. The external surface of this membrane was bathed with a muco-purulent liquid, smelling like dental caries.

At the base and anterior extremity of the tumor was an indentation, fitting the crown of a large molar that stood between it and the maxillary bone. This is very exactly shown in Plate I. fig. 3, *l. b.* A portion of the same tooth caused a slight elevation on the external face of the jaw,

(Plate I. fig. 2, *l, c.*) I also found the second small molar obliquely developed in the thick part of the bone, (Plate I. fig. 2, *l, d.*) directly beneath the alveolus of the first molar, which was standing in its true position, (Plate I. fig. 2, *l, e.*) This second molar was the tooth that I had encountered in the operation.

All the teeth, except the two last molars, had now been found, and the alveolar space appropriated for them was filled by the tumor. What, then, has become of the two great molars? Can it be that the bulbs, compressed from their very origin, have disappeared without leaving a single vestige of their existence? The numerous instances that have occurred of the simultaneous development of teeth and anomalous productions in the very centre of the maxillary, will not allow us to accept this explanation. In all the analogous cases that have fallen under my observation the teeth were of their ordinary dimensions and complete in number, although removed from their normal position, and sometimes buried even in the morbid substance itself.

In the case under consideration, I believe that this theory can be directly disproved by observing the origin of the tumor, with its mode of development, symptoms, seat, and particularly its anatomical characteristics. Microscopic observation arrives at the same result already reached by direct intuition—that is, that the tumor is composed of the integral substances of the teeth themselves, (see Plate I. fig. 4.) This is in itself sufficient to prove the origin of the tumor, which has been further exhibited by the micrographic observations, made by Professor Ch. Robin, upon the anatomic section. The results of his examination have been communicated to me by this *savant observateur*, and will be found in the appendix to this treatise. I therefore feel no hesitation in declaring that the nutrient fluids first formed the two missing molars in their respective isolation and regular development, and afterwards produced the informal aggregation of the dental elements by a hypersecretion and morbid diffusion.

If we proceed from the consideration of the substance of this anatomical monstrosity to the original influences which prepared the way for its appearance, we will find that the fibrous membrane which envelops the tumor will assist us in determining its point of departure, and in comprehending the mechanism of its formation.

This membrane is confined to that portion of the tumor contained in the cyst, and forms a line of demarcation between it and that portion projecting above the osseous ledge. I believe this to be only an exaggeration of the normal anatomical arrangement, which exists in very restricted proportions when the evolution of the teeth occurs regularly.

The membrane that envelops the base of the tooth is called by many anatomists the alveolo-dental periosteum, and is described with great precision by M. Oudet, under the title of the cortical membrane, because

it has the function of producing the cortical substance or cement which is superimposed upon the ivory-like substance. This membrane is really the external plate of the dental follicle, and appears on our anatomic section much modified by the peculiar pathological action to which it has been subjected; this modification also appears in the bulb or odontogenic capsule. The morbid activity of the secreting organ explains the appearance of the ivory in the centre of the tumor, as well as the osseous cement so abundant on its circumference. This double arrangement is identical to both of these substances in the regular composition of the tooth, and is in itself sufficient to prove the character of the origin of the tumor.

The results of the observation may be stated in brief, thus:—

1st. An original union of the follicles of the two last molars, followed by an intimate fusion of them, caused by phlegmasial or other action.

2d. Under the same morbid influence, the excess of vitality in the organic elements of the follicles has produced hypersecretion of ivory-like and osseous substances.

3d. That the irregular aggregation and diffusion of these has constituted the pathological growth.

4th and lastly. Its growth has formed in the jaw the cyst already described; and it has maintained therein a permanent inflammation, which has disorganized the osseous tissue and altered the structure of the adjacent soft parts to such an extent that a radical operation is unavoidable.

Final results of the operation.—Two years afterwards I again examined M. L. The right half of the maxillary was depressed toward the mesial line, and carried backward at the same time. The prominence of the chin inclined a little to the right, and the inferior dental arch was nearly a centimetre behind the superior at the extremity of the stump. The interval diminished regularly, and was hardly appreciable at the level of the great molars. This want of parallelism almost disappeared when the elevator muscles were contracted to a certain degree, so that mastication was not difficult, but it was very evident in the lowering movement of the maxillary. The deviation of the bone from the right to the left had given the same direction to the floor of the mouth, the tongue, the velum of the palate, and to its columns, without hindering the exercise of the functions of these organs. The portion of the left ramus, which remained in the wound abandoned without possible antagonism to the contractile action of the temporal and external pterygoid muscles, had been carried upward and inward against the base of the zygomatic arch, where it remained immovably fixed.

A band of cicatricial tissue extended between the two osseous extremities, connecting them, and was coextensive with the incision. This plane of strong inodular tissue (*lacking calcareous matter?*) offered a point of support for the various movements of the tongue. Another case has

come under my observation where the patient had, ten years before, submitted to disarticulation of one side of the jawbone; and in which this same tissue had, in a rudimental form, re-established the continuity of the bone, the play of which became constantly more precise and energetic.

Reflections.—When, considering the pathological anatomy of this case, I said that there was no analogous case on record, I did not intend to disregard the existence of the different anomalies of nutrition and dental development that have been described; nor the histological connection existing between them and the case under consideration.

These anomalies, though numerous and varied, are generally formed by the lateral reunion, or, more frequently, by the partial reunion of two or more contiguous teeth, and have no influence upon their form, position, or functional aptitudes, nor any morbid effect upon the maxillary. For this is sufficient to distinguish these slight anomalies from those which, by the considerable development and complexity of the elements which compose them, exclude all serious analogy, at least in a surgical point of view, between them and the former. I say surgically, because, anatomically, the similarity in composition, and in the laws of formation, of the primordial tissues implies, both in the simple and complicated fact, a common teratological influence, and a harmony of necessary filiation, both based upon a series of intermediate facts, which may be considered as so many steps by which the simple is lifted into the composite.

According to the doctrine—which its eminent author, the illustrious Geoffroy Saint-Hilaire, has so ably generalized, in applying it to the philosophic study of the dental system of the mammifera and birds—the case of partial fusion between two or more teeth, either at the crown or root, can be considered as the point of departure of the anomaly which I have exhibited in such unusual proportions. They are the first step made by nature beyond the regular methods of physiological development, and a preliminary step to a truly strange, informal, and monstrous arrangement.

When considered, either in regard to its initial type, or under its more advanced form, this anomaly cannot be explained, in either case, by the morbid primitive state of the odontogenic follicles, since when deprived of the vascular element these dental substances are, according to M. Oudet and others, incapable of being the seat of nutritive or pathological action. Those who hold this opinion are forced, in order to account for the alterations of structure and form which they represent, to go back to the method of their formation, for it is only by that, that they can belong to organization, and be subjected to the laws which govern it.

Attribute it to whatever disease of the follicles you please, or with Geoffroy Saint-Hilaire consider it as a simple derogation in the method of physiological growth, the grouping of the dental elements in one amorphous mass in the human species can only be understood if, with the

learned author of the theory of analogues, we refer to that which occurs at the very origin of the evolution of the teeth: "Each dental rudiment," says the illustrious naturalist, "is then surrounded by an exhalent membrane, which causes the growth of the tooth. As this becomes isolated, it grows in that condition and forms a simple tooth; but, if two osseous nuclei approach and touch, while this exhalation of the nutritive fluids is taking place, they unite, crystalize into veritable stalactites, and form a compound of the various dental elements. The molars are thus formed, and also those dental agglomerations which are the natural growth in the elephant and other ruminating animals, and occur but exceptionally in man."

It was a case similar to the preceding that Geoffroy Saint-Hilaire had in view when he expressed the opinion that I have just quoted, and he has given a drawing of that anomaly in the appendix of his "Dental System of the Mammifera and Birds." A copy of this drawing will be found (Plate II. fig. 3) in this essay, and the reader will readily perceive that it is not without some analogy to the case described in my first observation.

OBSERVATION 2.—Dental tumor occupying the alveoli of the two first molars.

The subject of this observation—communicated in 1809 to the Faculty of Medicine by M. Oudet, then house-surgeon at the Hôtel-Dieu—complained of the great inconvenience caused by a tumor in the inside of his mouth. The tumor was formed of a large mass which had at first been supposed to be tartar. It protruded perceptibly above the level of the dental arch, and caused a large swelling on the side of the cheek. The extraction was easily made, and its form and nature could then be decided upon. According to the description given by M. Oudet, the tumor resembled a cone planted upon its summit in the alveolar cavity, and connected by its base with the crown of the contiguous teeth. It consisted of an aggregation of the dental elements belonging to the small molars, some of which, by their disposition and their reciprocal arrangement, reproduced, in small, the form of the incisors and of the milk canines.

In this case, the pathological influence had the effect of exaggerating the elementary parts of the small molars, and, by associating them irregularly among themselves, had restored them to the condition of a solitary tooth.

There are other intramaxillary tumors which are not, like those that have been occupying our attention, due to a morbid and original aggregation of the various dental elements, but to the secondary hypertrophy of one or more of the same elements.

The tooth which presents this anomaly of nutrition generally preserves its principal physiological characteristics, and the alveolus that is its

receptacle is not sensibly modified in form, while the tumors, almost always confined to the dental roots, are not much developed—thus they are, for the most part, inoffensive, and are not perceived even by the individuals who are affected by them.

It is only when they increase and reach a dimension large enough to change the vital conditions, and the appearance of the jaws, that these tumors end by constituting a morbid case necessitating a resort to surgery.

Figures 1 and 2 of Plate II. exhibit an anatomic section belonging to a similar fact. It was observed by my colleague, M. Maisonneuve, under the following circumstances, which he has had the kindness to communicate to me :—

OBSERVATION 3.—Intramaxillary osseous tumor united to a neighboring molar tooth. Simultaneous extraction of the tooth and tumor.

A man, aged forty-five years, came from a province to Paris, to be relieved of a tumor in the inside of his mouth, which caused him inconvenience and severe pain. This tumor occupied the left side of the lower jaw and formed a large swelling on both sides of it, especially on the external face, where it resulted in an unsightly alteration in the features. At the small extremity of the ovoid represented by the tumor, was a carious tooth, the crown of which was completely destroyed, and a large portion of the tooth hidden by the projection of the gum that supported the morbid product inclosed in the alveolus. Before commencing to operate upon the tumor, M. Maisonneuve directed his patient to have the tooth extracted, hoping that its removal would open a way for a better exploration and easier approach to the encysted product. This preliminary operation had an unexpected and definitive result, for the same stroke brought away the tooth and the tumor that was annexed to it.

The size of the latter exceeded that of a large pigeon-egg, and it was connected with the tooth by a very narrow pedicle. The cut which was made in it along its axis allowed the operator to ascertain the line of intersection between the tumor and the dental root. A microscopic examination of the piece demonstrated that the tumor did not contain any ivory, and that it was formed of osseous tissue exclusively.

The patient was not long in recovering. In consequence of this double extraction, the walls of the alveolus, which had been turned aside and raised by the tumor, subsided; a slight inflammation attacked the internal surface of the cyst, which, shrinking insensibly, gradually contracted, and was at length completely closed up.

Comparative anatomy has proved that morbid productions, analogous to the preceding, occur in animals, especially in the large ruminating animals. M. Goubaux, professor of the veterinary school at Alfort, has published some examples, and I annex a drawing of an anatomic section

now in my possession, for which I am indebted to the kindness of the Honorable M. Leblanc, member of the *Académie de médecine*. This anatomic section has the double interest of exhibiting conspicuously both the anomaly of nutrition which constitutes it, and the alteration of the maxillary bone that has been the consequence of it.

OBSERVATION 4.—Osseous tumor encysted in the upper jaw of a horse.

The tumor was found in the interior of the alveolus of the superior canine tooth, having no adherence to the tooth, which exhibited its natural development, and was driven back sensibly toward the median line, to make room for the morbid aggregation. (Plate II. fig. 5.)

The tumor was of an irregular form, and about the size of an egg, (Plate II. fig. 6,) and it was encysted in a cavity formed at the expense of the maxillary bone, (Plate II. fig. 5.) The progressive alteration of the osseous tissue, the formation of a purulent collection in the interior of the cyst, and the spontaneous opening of the latter, by means of ulceration, were the accidents to which the tumor gave rise.

As to the nature of the production, microscopic examination proved that it, like the preceding, was formed entirely of osseous substance, or dental cement.

I must not omit to say, that the surfaces of all these morbid productions are covered by an enveloping membrane, which is none other than the alveolo-dental periosteum. This membrane secretes the osseous elements whose aggregation constitutes the intra-alveolar tumors, which are, in our opinion, incorrectly considered to be dental exostoses. To regard them from this point of view, is to refer to them all the physiological explanations that are suited only to the dependencies of the osseous system. It is to admit that they draw their origin from the tooth itself, whereas it is in reality a question of a substance entirely distinct from it—a substance that is in formation and growth completely foreign to the organic operations to which this owes its development.

The absence of all original community between the tooth and these osseous products of accidental formation, is clearly shown by the preceding observation, which exhibits the production isolated, and without any relations by continuity of tissue with the canine of the horse, with which it was in simple juxtaposition.

There is another fact which I also derive from comparative pathology, and which is of a nature to exhibit the really considerable degree to which simultaneous hypertrophy of the dental substances can rise; and the gravity of the disorders which it creates in the thick part of the bones where it occurs. I have reproduced, in its natural dimensions, the anatomic section relative to this fact, which has been communicated to me by M. Boulay, professor of the school at Alfort. (Plate V. fig. 1.)

OBSERVATION 5.—Rare case of dental hypertrophy in a horse.

The figure represents the second grinding tooth of a horse affected with glanders—a disease which killed him.

This animal showed a considerable development on the right side of the upper jaw, at the centre of which a very unusual increase of the second grinder had produced a very extensive inflammation, characterized by the rarefaction of the osseous tissue, and the enlargement of its spongioles.

The tumor was quite irregular in form, and weighed more than a kilogramme, (2·2055 pounds avoirdupois.) It was formed by the simultaneous hypertrophy of the ivory substance and of the cement, but in the largest part, by the hypersecretion of the latter. Deposited in successive beds, and of unequal thickness at the surface of the tooth, this substance there formed bumps or swellings superposed and separated from each other by a sort of circular groove—an arrangement that explains how such teeth are inclosed in the interior of the jaws, and shows the reason of the impossibility of extracting them without breaking the dental arch, which includes exactly that depression or species of strangulation intermediate to these anomalous swellings.

This pathological section has one very interesting particularity, viz., that in the interior of these bumps or swellings there are cavities containing movable fragments of osseous tissue, and which, broken close to the two openings (Plate V. fig. 1, *b* and *c*,) in the walls of these cavities, manifestly extend with the spongy tissue of the jaw. Add to this, that microscopic examination leaves no doubt upon the osteo-ivory structure of this dental block, and also exhibits the parallel arrangement of both substances. (Plate V. fig. 2.)

It is unnecessary to dwell longer on this point to make it understood that, among men as well as among animals, it rarely occurs that a tooth is thus altered or deformed without the maxillary bone on which it is planted becoming the seat of a pathological state varying in gravity and extent according to the intensity and duration of the action of the cause which produced it. This fact has been correctly noticed by M. Boulay, in his remarkable treatise upon the diseases of the dental apparatus of the herbivora.

I cannot conclude this part of my work, which is particularly devoted to the consideration of the osseous lesions produced by the anomalies of nutrition of the teeth, without including an instance, rare, and therefore interesting, of partial necrosis of two secondary incisors in a child of three years of age.

The observation and the anatomic section belonging to it has been sent to me by Dr. G  ry, *Senior*.

OBSERVATION 6.—Anomaly of nutrition of the secondary incisors in a child of three years. Necrosis and elimination of a considerable portion of one of the intermaxillary bones.

A child, aged three years, had shown for some weeks a considerable tumefaction of the gums of the right incisors of the upper jaw; the tumefaction was painful, especially to the touch. Called to attend the child, M. Gély prescribed lotions with an aluminous solution; these after some days reduced the inflammation, and the swelling which was the consequence of it. It then became apparent that these teeth were movable, and that a purulent liquid was issuing from their alveoli. The fall of these teeth occurred spontaneously some days later, and M. Gély ascertained the existence of a large and movable deposit, which was easily extracted with dressing forceps.

I have examined with great care the osseous section sent to me by my honorable compeer, and I have assured myself that it consists of almost the whole of one of the intermaxillary bones. (Plate VI. fig. 1.) The surface of the deposit is rugose and unequal, and marked by a very large number of little vascular canals. On its lower edge are the alveoli of the two temporary incisors, and above these are two cavities, raised one above the other, in the thickness of the bone—these contain the permanent incisors, which are larger than those in an adult.

Coinciding as I do with the author of the preceding observation in his opinion upon the nature and origin of the affection which resulted in the elimination of this large deposit, I think that the premature evolution of the germs of the second dentition was the point of departure. The want of all proportion between the dimensions of the alveolar arch, at the age of the little sufferer, and the size of these anomalously-developed teeth, shows the reason of the ulcerous inflammation that caused the fall of the milk teeth, and the more profound lesion which compromised the incisive bone itself.*

CHAPTER II.

ANOMALIES OF POSITION OF THE TEETH, THEIR PATHOLOGICAL CONSEQUENCES.

IN order to complete the study of the histological connection between the dental anomalies and the diseases of the jaws, it is necessary to consider the anomalies of position of the teeth which, like those of nutrition

* This observation decides, in my opinion, the question now under debate before the *Académie des Sciences*, relating to the existence of the intermaxillary bones. According to M. Rousseau, who has found a convincing opponent in Dr. Larcher, this bone does not exist; the anatomic fact which I have just recorded seems to me to prove the contrary and to establish the opinion of M. Larcher.

already described, are the point of departure of a certain number of pathological facts.

These anomalies, considered in reference to their seat, can be divided into two orders. In the one, the tooth altered from its natural position is found in the continuity of the alveolar arch; in the other, on the contrary, the tooth is found at a point of the jaw more or less distant from that arch. I have represented (Plate IV. figs. 1, 2, 3, 4,) some examples of these various anomalies. In some of these (figs. 1 and 4) the teeth occupy the alveoli, while in the others (figs. 2 and 3) they are at a marked distance—especially the supplementary canine tooth, which is incased horizontally in the thickness of the roof of the nasal fossæ, in the interior of which it forms a very considerable elevation.

The *Bulletins de la Société anatomique* (vol. ii. p. 25, obs. by M. Lacroix) contains an example of a superior incisor directed upward and backward, and received into an accidental cavity which it had hollowed out of the two maxillary bones. This cavity resembled a maxillary median sinus having from seven to eight lines of diameter. The observation does not say whether this morbid disposition was revealed on the exterior by any appreciable signs, but it is easy to comprehend that such a cavity, in developing itself, must have subsequently constituted a more important lesion and rendered a surgical operation necessary.

It is true that anomalies often remain undiscovered during the life of the persons affected by them, or manifest themselves only in objective signs too feebly pronounced to be considered as pathological facts. It more frequently occurs that they are the cause of incessant irritation, which has the effect of making the regular teeth carious, of giving place to the formation of fistulous abscesses, and even of causing the alveolar edge to become carious. (See Plate IV. figs. 3, 4.)*

In some cases, the only indication of the existence of these anomalies is the persistence of dental neuralgias, that are so acute as to have the most fatal results, as is proved in the observation reported by Dr. A. Desirabode in the *Journal des connaissances Médico-Chirurgicales*, September 1st, 1851.

OBSERVATION 7.—Anomaly of position of a wisdom tooth—extremely severe dental neuralgia—death by suicide.

This observation treats of an individual named Chéron, a wheelwright, born in 1816, at Villefranche. This man was carried, in 1841, to the Hôpital de la Pitié, during the attendance of Lisfranc. He had been for some time subject to violent pain in the teeth, and had thrown himself

* The reader can consult, with advantage to himself, a treatise entitled *Les déviations de la dernière molaire et les accidents qui peuvent accompagner sa sortie*; published in 1826, in the *Revue médicale*, by Dr. Toirac.

into the street from the window of his chamber, which was situated under the false roof, (*combles*?) At his entrance to the hospital he exhibited numerous contusions, and he was in a state of profound prostration; during the following night he was attacked with lock-jaw, and died the next day.

At the post-mortem examination the inferior left wisdom tooth was found placed under the gum, which was much tumefied; it was directed from behind forward, its roots corresponding to the base of the coronoid apophysis, and the crown resting against the last large molar, upon which it exerted a strong pressure.

Can we not, in this case, agree with Lisfranc in attributing the suicide of this individual to the state of exasperation maintained for some time by the dental suffering to which he was a prey? This view seems to me to be not without foundation; and I am ready to admit that these pains have not been without influence upon the production of tetanic accidents. I will also remark that the three other wisdom teeth of this person showed no peculiarity, being regularly developed.

I have said that in their change of position, by a species of migration, the teeth sometimes remove themselves from the alveolar ridge. In addition to the fact that I have already cited in support of this assertion, I am able to add an observation by Professor Blandin. (*Des dents. Thèse de concours*, 1846.) It is interesting in more than one respect, and proves that the teeth, thus removed from their regular position, can form tumors more or less voluminous at the surface of the jaws, which have a difficult diagnosis, and become the occasion of lamentable errors to the surgeon.

OBSERVATION 8.—Anomaly of position of two molar teeth giving rise to a tumor of the palatine arch—supposed cancer of the maxillary bone—error of the diagnosis discovered during the operation.

A woman, forty-three years of age, entered at the Hôpital Beaujon for a malady of eighteen months standing, which was characterized by two ulcerations that occupied the nose and the right cheek; these ulcerations were fungous at the retroverted edges, and were subject to shooting pains. The patient exhibited, besides, a tumor of the shape and size of a walnut upon the left side of the palatine arch; it was limited on the outside by the dental arch, on the inside it passed the median line and extended, in the antero-posterior direction, from the neighborhood of the canine tooth almost to the velum of the palate. Struck with the carcinomatous aspect of the ulcerations of the face, Blandin, whose opinion was supported by Marjolin, formed an unfavorable diagnosis of the tumor, which he judged to be of a malignant nature. He was also decided that the treatment should aim at the same time at the removal of the palatine tumor and the cauterization of the ulcer of the face.

Consequently, a crucial incision was made in the tumor, the flaps were dissected, and the surgeon had already disposed himself to attack with gouge and mallet the tissue that he believed to be diseased, when, after sponging the wound, he perceived a *white body, slightly brilliant*, in the centre of the tumor. On touching it he found that it was movable, and, seizing it with the forceps, he extracted it. It was a molar tooth with three very short roots, but the crown was the shape and size of the first great molar. A second tooth was extracted from the same; it was not so large as the first, but, like it, multicuspid. Great was my surprise (says Blandin) and that of my assistants; and it was only then that, by questioning the patient, he learned that several of the teeth of the upper jaw had never appeared above the surface. He decided from this that the intramaxillary occlusion of the two molars, so unexpectedly discovered, had been the cause of the malady, which it had constituted exclusively. The teeth, directed obliquely inward, had pierced the internal part of the alveolar ridge, and placed themselves between the mucous membrane and the corresponding osseous plane.

The wound of the palate was then cauterized to stop the flow of blood, the ulcerations of the face treated with several repetitions of nitrate of mercury; and the patient left the hospital two months afterwards, cured.

Were the ulcerations of the face cancerous? Blandin, at the close of the observation, reaffirms it; and, according to him, there was a double malady. This view of the question is open to discussion. In effect, so rapid a cure of an ulcerous cancer would appear unusual, and not very probable.

However that may be, the fact that is important to this inquiry, and which this observation will serve to establish, is the possible existence of tumors developed in the body of the maxillary bones, and constituted by the aggregation of several teeth transplanted in some fashion to a distance from the place of their normal development.

A like tumor occupying a point of the lower jaw distant from the alveolar ridge had been, according to Blandin, (*loc. cit.*, Thèse de concours,) removed by Marjolin and Duval, who, not so fortunate as himself, did not discover in time the error of diagnosis into which they had fallen. These facts are sufficient to show how important it is that the surgeon should not be ignorant of these migrations or changes of place in the teeth, and that he should take them into very great consideration every time he makes a diagnosis upon a tumor thus developed in the neighborhood of the dental arches.

Accidents produced by this variety of anomalies.—When the tooth that is turned from its regular position by this variety of anomaly only constitutes exceptionally, as in the preceding case, a serious pathological accident, being situated at such a distance from the other teeth that it cannot check their regular evolution, it is not the same thing as when,

preserving its right of domicile in the continuity of the dental arch, it is there developed in a vicious attitude, which necessarily changes its natural relations as much with the contiguous teeth as with the maxillary bone itself. It can be easily foreseen that in such a case the osteite which is thus removed may be the active and permanent cause of an irritation, that modifies, in exaggerating, the vitality of the osseous tissue, and becomes there in this way a point of departure of a lesion more or less serious, according to the nature, otherwise variable, of the morbid production that constitutes it.

Thus the osteite and its numerous consequences,—caries, necrosis, abscesses, cysts, hypertrophy of the osseous tissue as well when restricted to the inorganic or calcareous element as when especially affecting the organic or fibro-cellular substance, a morbid disposition which causes the very frequent appearance of fibro-plastic tumors in the continuity of the maxillary bones—such are the various lesions that clinical observation authorizes us to ascribe to the teratological influence that I have indicated, and which the following observations will be sufficient to prove.

OBSERVATION 9.—Anomaly of position and development of a wisdom tooth; the penetration of one of its roots into the dental canal; medullary osteite of the ramus of the maxillary bone; resection and disarticulation of one of the condyles of that bone.

A man, aged twenty-six years, had been for a long time affected with very acute dental neuralgia, which was seated in the alveoli of the last molar teeth of the right side of the lower jaw, which was observed to increase in size through the whole extent of its ramus. The tumefaction soon became considerable, and, at the same time, a considerable inconvenience occurred in the play of articulation; this was progressive and always increasing, as was the swelling that soon after extended to the whole masseterine region. This difficulty became such that the lowering of the jaw was impossible. Hard, resistant, and irreducible under pressure, this swelling was the evident result of a hyperostosis.

The invalid then decided to enter the Hôpital de la Pitié, during the service of M. Maisonneuve, who, after laying the osseous tumor bare, applied the crown of a trepan with the intention of finding the tooth which he presumed to be the cause of the malady.

The insufficiency of this operation made him decide to resect the ramus of the bone, by disarticulation of the condyle and by a cut of the saw through the alveolus of the first large molar.

The anatomic section was sent to me by my honorable colleague, and I ascertained in it all the characteristics of an osteite in various degrees of development. Sawed according to its axis, I found in the body of the ramus many cavities lined with a pyogenic membrane that was bathed with pus on its surface. Some of these cavities were completely closed by osseous tissue, while others were opened in the interior by means of

the ulceration of the same membrane. One of these cavities occupied the condyle, and was exposed by an opening near the articular cartilage. (Plate VI. fig. 3.) The development of this encysted abscess could not take place without producing the rarefaction of the areolar tissue of the bone and the simultaneous rising of the compact lamina. This double arrangement had had the effect of producing the considerable increase in the size of the ramus, the vascularity of which, pathologically increased, was revealed by the presence of numerous osseous canaliculi which were riddled with holes.

The medullary osteite terminated by the suppuration and elimination of the deposit and of splinters of bone in the interior of the purulent cavities. It had effected a less rapid progress at the level of the angle of the jaw, where the hypertrophical condensation of the osseous elements existed in a considerable proportion. It was at this point that the crown of the trepan was applied without success; no doubt the inflammation had there had in the end the same issue as in the rest of the ramus, and that it was there also terminated by ulceration.

As to the cause of the malady, I do not hesitate to attribute it to the anomalous enlargement of the wisdom tooth, which was inclosed in the base of the coronoid apophysis, and extended hardly a millimetre beyond the edges of the alveolus, which it had there formed for itself. This, like the dental crown that filled it, was twice as large as it would have been in ordinary conditions, and the wisdom tooth pressed forward against the neck of the neighboring tooth (second large molar) in such a way as to take position in the dental arch, and necessarily displaced that tooth which had hindered its ascent. Was it on account of this obstacle that the development occurred in the body of the bone?

A section of the jaw passing under the dental canal, open on its inferior wall, demonstrated to me that a communication existed between it and the alveolus of the wisdom tooth, which was united there by the extremity of one of its roots. These were otherwise far from being healthy, the summits were truncated, and the canal that traversed them exhibited an unusual dilatation. Finally, the bluish color of the ivory-like tissue indicated an alteration of structure which could not be more evident.

Other analogous facts argue still further in favor of the etiology, whence are derived, in my opinion, these different pathological states.

An anatomical demonstration of the first of these facts will be found in this work. (Plate III. fig. 1.) This fact was published in my inaugural thesis, (*loc. cit.*, Thèse inaugurale,) and I will therefore reproduce only such details as especially refer to the subject of the present essay.

OBSERVATION 10.—Osseous cyst of the body of the jaw; anomaly of development of the wisdom tooth revealed by anatomic examination.

Madame D., endowed with good health and of a strong constitution, entered the Hôpital de la Pitié in the month of April, 1838. This wo-

man exhibited a very considerable swelling of the right half of the jaw; it resembled in size and shape a large hen-egg. The tumor was bounded in front by the second incisor, and behind by the coronoid apophysis.

As to the origin and progress of the disease, Madame D. stated that ten years previously, and shortly after having her teeth cleaned, which she had always had in a bad condition, a small tumor had been developed in juxtaposition with the large molars. This tumor had increased progressively, and she had experienced several returns of very severe pain, which she attributed to the decay of the teeth, three of which had successively fallen.

The extent of the disease induced Lisfranc to make a resection of the half of the jaw. The operation was followed by a prompt cure, and Madame D. quitted the hospital six weeks afterwards.

The examination of the anatomic section shows a considerable induration of the soft perimaxillary parts, and under them a development of the body of the jaw, in the centre of which was a vast cavity filled with a sanious and purulent liquid. This cavity was formed by the two tables of the maxillary, which were very thin and reduced at many points to the mere thickness of the periosteum. The bottom, formed by the base of the bone, which was very much widened, presented in projection the crown of the wisdom tooth, protuberant at the interior of the cyst. Thrust horizontally against the base of the coronoid apophysis, the tooth is firmly inclosed in the calcareous tissue. (Plate III. fig. 1.) The anomalous position and regular development exhibited by the tooth in this vicious situation can leave no doubt as to the part that it had played in the production and successive evolution of the disease of the bone. An analytical examination of the anatomic section leads us to the conclusion that the wisdom tooth could not become enlarged without exerting a continual pressure upon the neighboring teeth, and that this pressure was the cause of the prolonged suffering endured by the patient, as well as of the inflammation of the gums, and the decay, loosening, and spontaneous fall of most of the other teeth.

Two other facts, not less interesting than this, have been communicated to me by my honorable compeers, MM. Nelaton and Maisonneuve. Differing from each other as to the nature of the osseous lesion which necessitated the intervention of art, they agree as to the original morbid disposition which appears to have been the point of departure of the lesion.

OBSERVATION 11.—Cyst of the ramus of the inferior maxillary, coincident with the presence of a molar tooth in the cavity.

The sufferer was a woman, about thirty years of age; her cheek had become slowly but progressively tumefied. This tumefaction was accompanied with dull pain, and was the result of the anomalous development of the ramus, which finally took the shape of a quite regular half sphere.

This increase in the inferior maxillary especially affected the external table, which was raised into a hemisphere, while the internal table preserved its regular direction, and M. Nélaton wisely decided to attack the tumor with the bistoury and the gouge. In pursuance of this decision, the soft exterior parts were properly cut and the external wall of the cyst was circularly resected. This once raised, he could explore the cavity, and he found that a tooth had caused a projection at the most dependent part. (Plate II. fig. 4, *l*, *b*.) This tooth, partly in relief in the cyst and partly inclosed in the calcareous tissue, was removed after several attempts. The operation was a complete success. The woman subjected to it has not in ten years had a return of the affection, which, being located in a part of the jaw in juxtaposition with the tooth which was removed from its normal position, owed its existence to the presence of that anomaly.

The preceding observations are, it seems to me, of a nature to throw light upon the origin of certain cysts that are frequently met in the thick part of the jaws, the formation of which has been connected by recent researches with the natural cavities of the organism—that is to say, with the anomalous growth of the dental follicles themselves.

One of the grounds of this opinion has already been stated to be the seat of the tumors which invariably appear in the continuity of the alveolar arch, and another is the age of the patients, which most frequently corresponds to one of the two phases of life characterized by the double work of dentition. This opinion is founded still more upon the results of anatomic examination, which, with the aid of the microscope, has often proved the existence of an epithelium in the interior of the cysts. This epithelium is evident, especially in the interior of those where the roots of several teeth protrude. (Vide *Bulletin de la Soc. anat.*, vol. xxii. p. 506. Obs. by Dr. Dénucé.) Does not the presence of this epithelium indicate that a physiological tissue, serving as a case for a normal cavity, has been obliged to conspire to the development of these cystic tumors and to serve in some way as a base to their definitive constitution?

As I am a partisan, pathogenically, of the doctrine of naturism, (*naturisme*), which considers the most of these morbid anatomic productions to be merely an infraction of the primitive organic type, I willingly accept this interpretation, the justice of which is demonstrated to me by the existence of alveolar cysts that are in direct communication with the dental follicle.

The last observation that remains to be mentioned offers an additional support to my view of this subject. This observation is complex; it combines two distinct pathological states. One of these, the primitive or original, is a dental cyst with an epithelial casing; the other, the secondary or consecutive, is a rarefying osteite of half of the body of the inferior maxillary, which necessitated the disarticulation of that bone.

OBSERVATION 12.—Dental cyst; rarefying osteite of half of the inferior maxillary.

A young man, twenty-seven years of age, consulted many of the surgeons of Paris for a swelling of the right half of the body of the lower jaw, which was tripled in size. He was almost incessantly tormented with a dental neuralgia which had commenced ten years previously, and the patient said that at about the same period he had remarked a slight and circumscribed tumefaction of the jaw beneath the molar teeth—it existed then as a kind of node that remained stationary for a long time. The progress of the tumor had become appreciable only three years before, and its evolution was then marked by continual pain, which was, nevertheless, moderate and not lancinating. At the time mentioned, the body of the jaw had become deformed throughout the right half, representing a quite irregular ovoid with some points in relief; the gums were red, thin, and tumefied, and bled very easily. The teeth that were on these gums were most of them altered from their natural direction and more or less movable. The submaxillary region showed some congested lymphatic ganglions.

My colleague, M. Maisonneuve, was called to attend this young man. He considered it necessary to disarticulate the half of the jaw. He performed the operation in the course of the month of April, 1857, and it was, eight days after, followed by the death of the patient, which was caused by a gangrenous inflammation of the wound and an abundant secondary hæmorrhage.

What was in this case the nature of the malady, which, appreciated differently during the life of the subject, was successively considered to be a cyst, a cancer, and finally, an osteite?

The examination of the anatomic section answered this question, and demonstrated that it was a matter of complex lesion. It also revealed, first and foremost, the existence, in the centre of the tumor, of an excavation containing a large molar, directed horizontally; the crown was in front, and it had acquired its regular development in this vicious position. (Plate III. figs. 2 and 3.) This tooth was surrounded by a reddish, fungous production, which appeared under the microscope to be formed of a fibrous or fibro-plastic tissue, with an epithelial covering—an arrangement analogous to that which I have already pointed out, and proving that primitively it was a disease of a dental follicle. This was, then, the point of departure of a secondary lesion, which extended progressively over the whole of one side of the jaw, and characterized, as often happens with rarefying osteites, the enlargement of the interstices of the areolar osseous tissue, and the hypertrophical development of the organic substance in the interior of these interstices. The latter, by its predominance over the calcareous element, in the centre of which it formed a sort of myeloplastic production, explains the extreme fragility of the bone, which yielded under a very slight pressure.

The lymphatic ganglions, raised with the tumor to which they were attached, and, like it, examined by M. Broca, exhibited the characteristics of a simple inflammation of the glands. (*Bullet. de la Soc. de chir.*, vol. vii.)

I am not aware that there exists in the science any fact bearing even a remote analogy to the one just mentioned. It will be remarked, without doubt, that it contains in itself an anatomic demonstration sufficient to justify the double point of view in which I have considered the lesion of the maxillary bone, in the case of which it is the question. By referring the lesion to two distinct periods, the first, corresponding to the original inclusion of the tooth, and the second, to the morbid development of the bone—it is naturally divided into two pathological states, of which the latter was certainly the most serious, and which necessitated a considerable mutilation of the face. This last condition could have been averted if the dental encystment had been recognized and efficiently assailed at its origin by means of a rigorous diagnosis.

RESUMÉ.

DIAGNOSIS—TREATMENT.

THE diagnosis of the diseases of the maxillary bones which we are about to consider, and which have been generally comprised under the too vague denomination of osteo-sarcoma, has been long undetermined, confused, and liable to numerous errors.

Pathological anatomy, by a thorough study of the histological elements of these diseases, has recently given us a more exact idea of their nature; and, when combined with clinical instruction, permits us to distinguish between them, and to conform the treatment to the anatomical varieties that characterize them. This is the aim that I have proposed to myself in this work, and I will have attained it if, as I hope, the etiological researches contained in it have thrown light upon a question of pathology until now very obscure, and opened a way for a more severe therapeutical induction.

Thus, in recapitulating the observations recorded in this treatise from a symptomatic point of view, we find one constant and primordial fact that serves to point out precisely the very origin of the malady; it is the absence of one or several teeth which have not taken position in the alveolar arch at any epoch. This principal circumstance is usually accompanied by very obstinate neuralgias, that are caused by the displacement and elongation of the dental nerves which are deflected from their true direction. This same circumstance causes, more or less immediately, the formation of an intramaxillary cyst, which appears sooner or later on the exterior under the more or less distinct form of an osseous tumor.

When an osseous tumor appears having such antecedents, the surgeon is the more authorized in acting against it, because, in thus assailing the evil at its origin, his intervention can prevent the ulterior consequences, which, although varying in extent and gravity, have nevertheless one common characteristic—the development of the bone which is the seat of the tumor. The hyperostosis thus produced may be unilateral—that is, confined to one of the faces of the bone; or it may be juxta-alveolar, or circumscribed to a single alveolus; or lastly, it may be circumferential, in which case it occupies the whole of the osseous body.

The osteite, which, as we have seen, is the direct cause of it, is either condensing or rarefying.

In the former case, it is characterized by the peripheral accumulation of osseous elements in excess; this arrangement was particularly evident at the angle of the lower jaw and at the base of the coronoid apophysis in the subject of the ninth observation. (Plate VI. fig. 2.)

In the second case, the osteite causes a very abundant vascularization of the osseous tissue, the vitality of which is sensibly increased. The excessive nutritive movement which results is marked by the disaggregation of the calcareous elements and the hypertrophy of the organic substance, which in some cases even forms a genuine interlamellary myeloplasm, an arrangement that causes the jaw to lose its consistence, and makes it very fragile.

These two pathological states may end in suppuration, and cause the formation of numerous encysted abscesses. It is these that we have seen coexisting, especially with the anomalies in the position of the teeth.

The third morbid form is met more particularly accompanied with the anomalies of nutrition—that is to say, with those where the dental osteite constitutes a voluminous tumor. This form is explained by a sort of partial or general diduction of the two tables of the bone, which, by the slow reabsorption of its organized elements, is finally transformed into a cavity, the walls of which are formed of a bed of compact tissue that is often very thin. On the borders of these encysted products, it is not unusual to find the bone exhibiting in its continuity all the characteristics of the condensing osteite.

It is to be remarked that in all the observations the disease was developed very slowly. Stationary for a long period, the disease remained very distinctly circumscribed to the jaw, and did not at any phase of its evolution exert upon the constitution of the patient that deleterious influence which belongs to the accidental productions of a malignant nature. Finally, the most minute anatomical examination has in no case discovered the presence of heteromorphic elements of the nature of those that characterize cancerous affections.

This last circumstance, though not more favorable to the prognosis, is not less interesting in regard to the treatment. For if the intervention of a surgeon cannot be too radical in an instance of cancer, it is certain,

on the contrary, that more caution and moderation are necessary when it is a question of a lesion, which is essentially local and of a benignant nature, and allows the surgical operation to be restricted to the precise limits of the lesion, without it being necessary to provide against an improbable repetition, by encroaching upon the osseous tissues that border on it, and thus subjecting the patient to a mutilation which could not be justified.

Thus we have shown an instance where the disease was confined exclusively to the alveolar tissue, while the base of the jaw, if not perfectly intact, was at least but slightly affected. And the anatomical researches which I have presented demonstrate the possibility of preserving the continuity of the bone in most instances, and make it a duty of the surgeon not to have recourse first and foremost to the partial amputation of the jaw.

It would be wrong, however, to infer from this general remark that there can be practically a rule of uniform conduct for the remedy of the various pathological conditions described in this treatise. To draw up a series of precepts that are absolute and necessarily obligatory, when experience presents us with facts so different in form, aspect, and importance, although springing from a common origin, would have the effect of inclining us to disregard those particular indications which arise from individual differences, and are observed by nature even in the secondary disorders which occur not only in the maxillary bone, the seat of the evil, but also in the surrounding soft parts.

Thus, there are some cases, like that mentioned in the third observation of this treatise, which require only a simple extraction of the foreign body in order to make the cure complete. While there are others, on the contrary, that necessitate a much more serious operation.

In the latter, moreover, whatever they may be, the surgeon should take into consideration an important indication, for which we are indebted to the admirable researches of M. Flourens upon the regeneration of the osseous tissue, and preserve as much as possible the periosteum in the wound, by a sort of preliminary decortication of the jaw which he is compelled to remove.

In addition to this, and I hasten to make the acknowledgment, the way to treat such tumors is not always clearly indicated. However attentive the clinical examination may be, it does not always succeed in dissipating the incertitudes of the diagnosis, which is often rendered very obscure by the origin and seat of these morbid productions at the centre of the osseous tissue which envelops them on all sides. But the doubt, in such a case, militates in favor of that prudent and conservative surgery to which the artist should always hold his acts accountable.

APPENDIX.

MICROSCOPIC EXAMINATION OF THE TUMOR.

BY M. CH. ROBIN.

Pl. I. Fig. 4, (400 diameters.)—This figure represents a portion of a slight cut made into the tumor represented, (fig. 3, *a*.)

The preparation is taken from near the free edge, or the irregularly mammillated surface of the tumor. The latter is formed principally of the ivory or dentine, easily recognized upon the thin section by its very fine tubes, disposed parallelly, or nearly so, through part of their extent, (fig. 4, *c*.)

These tubes start, radiating more or less regularly, from the little depressions or cavities observable in the mass of the tumor, (fig. 3, *a*.) Very near to each other through part of their extent these tubes of ivory become more rare, fine, and ramified as they approach the surface of the dental tumor, (fig. 4, *d, f*,) and end in a very sharp point toward the lines of junction between the ivory and the enamel, (*a, b, c*,) and the cement, (*f, g, h*.) The presence of the ivory, which forms the greater part of the tumor, demonstrates its dental nature very clearly.

Enamel.—Another important particularity is the presence of the enamel on the surface of the tumor, where it in some measure covers the irregularities with a varnish which moulds itself upon them in order to penetrate more or less deeply into the fissures or depressions that divide the tumor superficially into lobes.

This bed of enamel varies in thickness from microscopic dimensions to a millimetre, (0.03937 inch,) or near it, and is as irregular in places on the lower or adhering face as it is on the free surface, which the microscope alone allows to be seen. The portion of the section of the tumor that is here delineated (fig. 4) is taken at the level of one of the points where the enamel (*a b*) in a manner penetrates (*c*) into the body of the ivory mass of which the tumor is principally formed.

The enamel is easily recognized by its narrow prisms, from six to eight thousandths of a millimetre in width, which are in immediate juxtaposition, (fig. 4, *a, b*.) The figure shows them inclined as by the accident of the cuts in making the section. When the cut is perpendicular, or nearly so, to their greatest axis, their prismatic form with five or six faces is easily seen; this is shown in the neighborhood of *b*, (fig. 4.)

2. SYNT

PLATE II.

FIG. 1.—*b*. Osseous tumor united to a molar tooth, (*a*.)

FIG. 2.—*a*, *b*. Section of the tooth and of the tumor.

FIG. 3 —*a*, *b*. Dental tumor formed by the anomalous development of the first two molars.

a. Summit of the tumor. *b*. The root of the tumor.

FIG. 4.—*a*. Cyst of the right branch of the inferior maxillary bone, the cavity of which is made visible by the circumferential resection of its external wall.

b. A molar tooth inclosed in the osseous tissue, and *en relief* upon the bottom of the cyst.

c. External wall of the cyst, inverted.

d. Condyle and neck of the jaw.

e. Summit of the coronoid apophysis, with the insertion of the temporal muscle.

FIG. 5.—Upper jaw of a horse; view of half of the palatine face.

a. Osseous cyst developed in the interior and right side of the jaw; it includes the tumor represented by Fig. 6.

b. Right canine, thrust backward and inward toward the medio-palatine line.

d. Alveolus of the left canine tooth.

e. Osseous perforation, conducting to the interior of the cyst.

FIG. 6.—Intramaxillary osseous tumor, (natural size;) it was contained in the cyst represented in Fig. 5.

FIG. 7, (300 diameters.)—Represents a part of the section of the tumor shown in Fig. 6. This tumor appears to be formed entirely of the cement or osseous substance surrounding the dental root. It is an exostosis of the dental cement. This exhibits the structure described in the explanation of Fig. 4, Plate I.

a. Vascular canaliculi of the osseous substance of the tumor, (Havers' glands.) The tumor traversed by these as in the normal osseous substance—only they are more rare, more scattered, and more irregularly distributed.

b. Osteoplasts disposed circularly, or nearly so, in a concentric manner around the Haversian canal, but less exact and evident than in the normal condition.

c. The osseous substance, properly so called, in which the osteoplasts, or characteristic cavities of the osseous tissue, are excavated.

PLATE III.

FIG. 1.—Represents a cyst occupying the whole extent of the right half of the body of the lower jaw, and of the coronoid apophysis. The external wall of the cyst has been removed, and permits a view of the cavity, bounded by the internal wall *b*, which remains.

a. The wisdom tooth, developed in an anomalous fashion in the base of the coronoid apophysis.

c. Dental canal, open through the whole of its extent. It does not communicate with the cavity situated above it.

FIG. 2.—*d*. Right side of the inferior jaw, affected by the rarefying osteite.

a. Large molar tooth encysted in the bone.

b. Interior of the cyst, with a black bottom, representing the membranous tissue that lined its surface.

FIG. 3.—Same cyst, open at the side of the mouth. It reproduces (*a* and *b*) the aforesaid anatomical arrangements.

FIGS. 2 AND 3.—*c*, *c*. Three incisor teeth, the canine tooth and the first two molars, removed from their position, and retroverted one upon another.

PLATE IV.

ANOMALIES IN POSITION OF THE TEETH.

FIG. 1.—*a*. Incisor tooth retroverted, and directed toward the intramaxillary symphysis.

FIG. 2.—*c*. Canine tooth developed in the thick part of the floor of the nasal fossæ, where it forms a prominence; the root is directed forward.

b, b. Section of the maxillary sinus.

d. Nasal spine.

a, a. Posterior edge of the nasal fossæ.

FIGS. 3 AND 4.—Two other examples of anomalies in the position of the teeth.

PLATE V.

FIG. 1.—*a, a.* Second grinding tooth of a horse, natural size, with considerable development of the roots transformed into two spheroidal swellings.

b, b. Portions of the maxillary bone sheathed in the tumor, and broken in its extraction.

c. Orifice conducting to the interior of an intradental cavity.

d, d. Circular groove corresponding to the alveolar arch, and forming a sort of strangulation between the tuberosity *a* and the swelling *e*, which is underneath.

f. Inferior surface of the crown of the tooth.

FIG. 2.—*Microscopic examination of the tumor, (300 diameters.)*—Represents part of a thin section of the tumor shown in Fig. 1. The tumor was formed jointly by a hypertrophy of the dental ivory and a hypertrophy or exostosis of the cement, the greatest part being formed of the substance of the cement.

a, b. Represents the ivory and its canaliculi—not ramified in this section—and terminating near the union of the ivory and enamel.

c, d, e. Exhibits the mammillated arrangement seen in the cement at certain points of the surface of union with the ivory or dentine. This arrangement, often very elegant under the microscope, is also met in the normal teeth.

g, h. Osteoplasts, or characteristic cavities of the cement. They are especially remarkable for their size in all the preparations taken from this piece.

f. Proper substance of the cement, or bone, in which the characteristic cavities are excavated. It is here, as always, homogeneous; little transparent, except when it is reduced to very thin laminae.

PLATE VI.

FIG. 1.—Intramaxillary bone bearing the two permanent incisors, (*a, a,*) superposed, and exhibiting an anomalous development. The alveoli of the same infantile teeth are partly destroyed; this section formed the deposit mentioned, (Obs. VI. of this treatise.)

FIG. 2.—Tumor of the ramus of the inferior maxillary bone, affected with mollities ossium. At the surface are many openings of encysted abscesses; and the last molar, the crown of which extends slightly beyond the alveolar edges, and is developed in the thick part of the base of the coronoid apophysis.

FIG. 3.—Section of the ramus, showing the numerous abscesses that exist throughout its whole extent.



Fig. 1



Fig 2



Fig. 3



Fig. 4

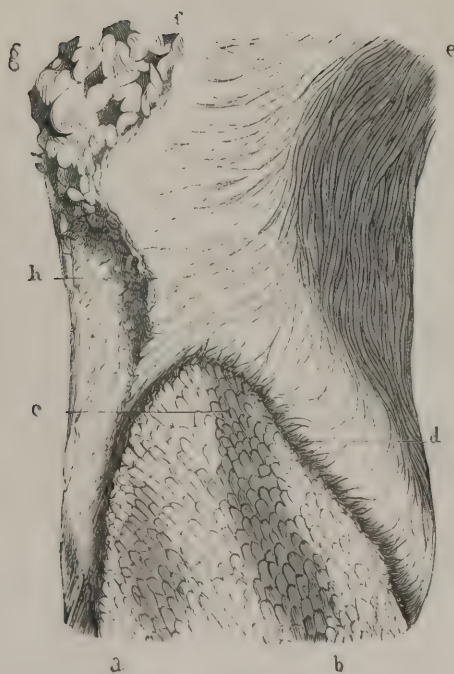




Fig. 1

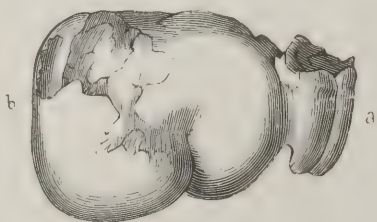


Fig. 2

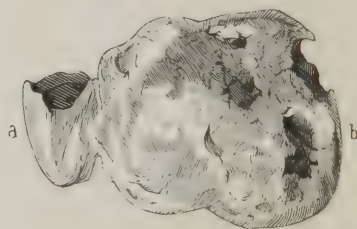


Fig. 3

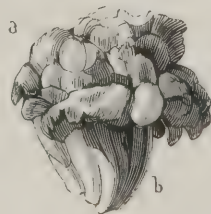


Fig. 4

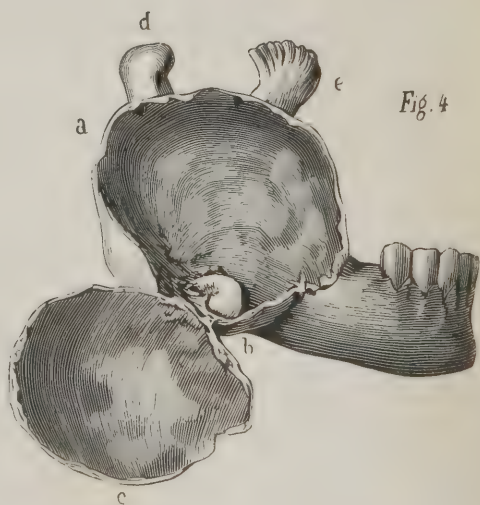


Plate II.

Fig. 5



Fig. 6



Fig. 7

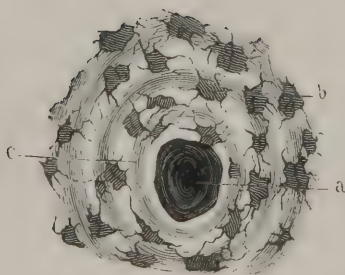




Fig 2



Fig. 1.



Fig 2.

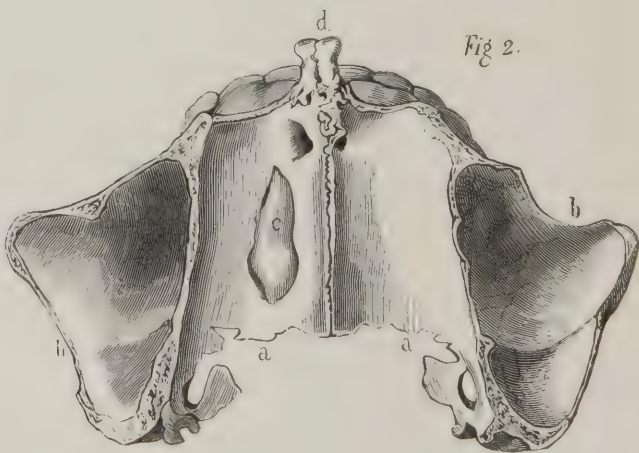


Plate IV.

Fig. 3.

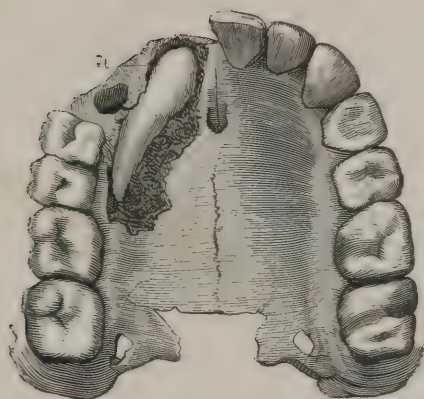


Fig. 4.



Fig. 1

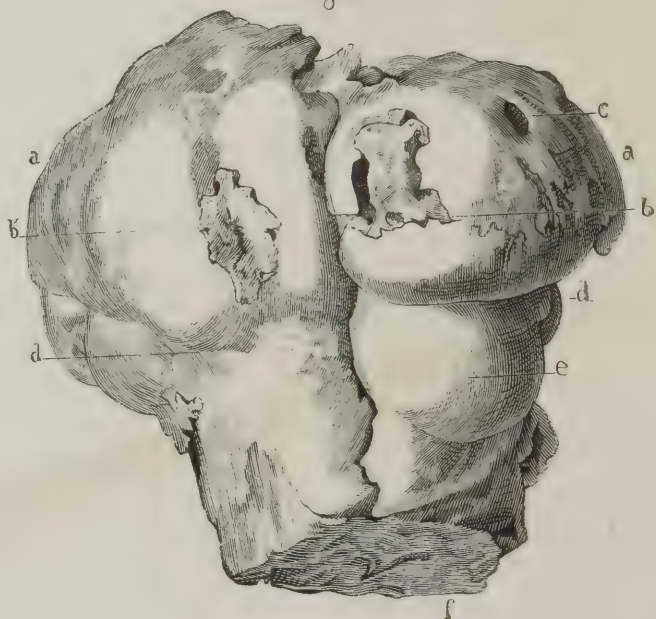
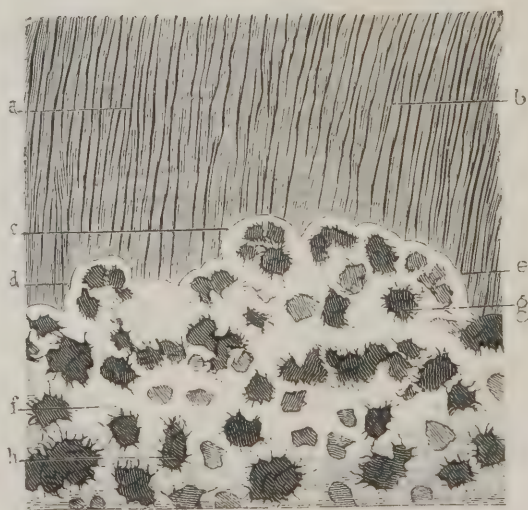


Fig. 2



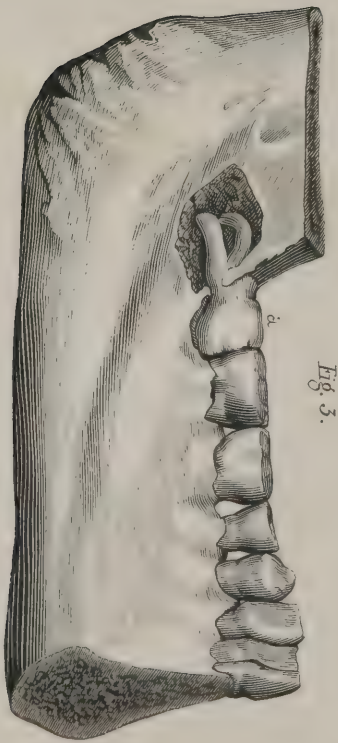


Fig. 3.

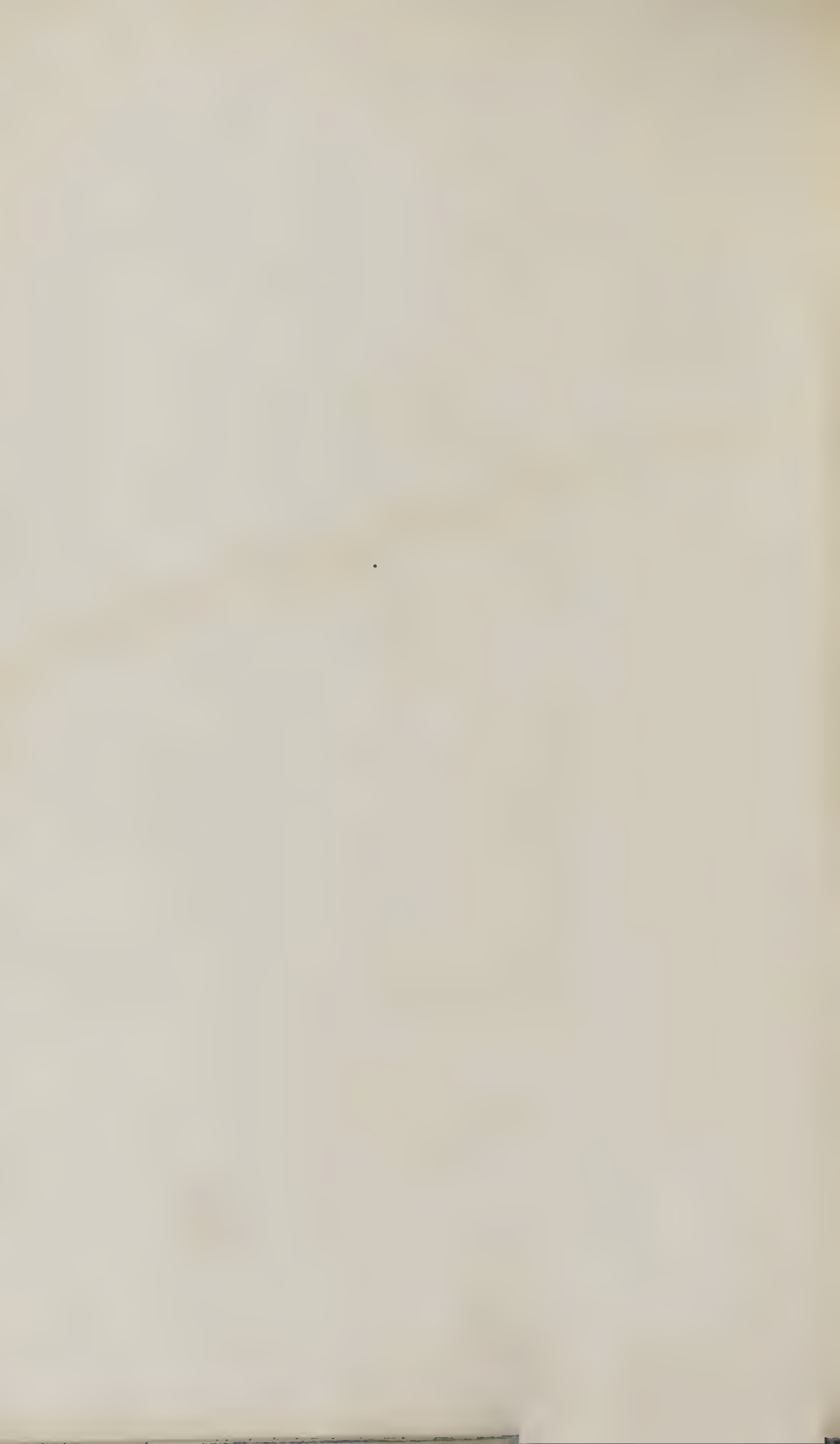


Fig. 1

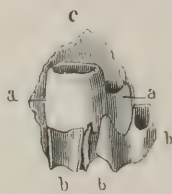


Fig. 2





Fig. 3

THE
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
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